

CH2M HILL Hanford Group, Inc.	Manual	HNF-IP-0842
CONTROLLING HOTWORK	Volume	9, Safety
	Section	5.8, REV 0b
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	Issue Date	June 2, 2003
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1.0 PURPOSE AND SCOPE (6.1, 6.2)

This procedure outlines mandatory controls for safe hotwork. For the purpose of this procedure, hotwork is defined as “high hazard” or “low hazard.” High hazard includes electric arc, oxy-fuel gas welding/cutting operations, and heavy grinding. Low hazard includes brazing, light grinding, tig welding, or other similar low energy activities.

2.0 IMPLEMENTATION

This procedure is effective on the date shown in the header.

3.0 REQUIREMENTS

1. If the classification of an operation is not clear, the job supervisor, in consultation with the Tank Farm Contractor (TFC) Fire Protection Engineer, shall determine the hazard category (i.e., high or low).
2. The safety precautions for activities that are neither high or low hazard (as defined in this procedure), such as pedestal/small bench grinders, sanders, and soldering, shall be determined by the job supervisor in consultation with the Fire Protection Engineer.
3. Exceptions to wearing fire retardant/resistant (FR) personal protective equipment must be approved by the job supervisor and the TFC Fire Protection Engineer on the Hotwork Permit. (Fire watch is always required.)
4. A fire watch is always required during the performance of hotwork outside a designated hotwork area. A fire watch may be waived on “low hazard” hotwork if approved by the job supervisor and the TFC Fire Protection Engineer.
5. If the work is to be done in a radioactive buffer area, contamination area, high contamination area, radioactive material area, or soil contamination area, the permit must be approved by the TFC Fire Protection Engineer. The TFC Fire Protection Engineer will ensure an evaluation of the intended use by Nuclear Safety & Licensing is performed prior to issuing the fire permit.

4.0 HOTWORK PROCESS

1. To the greatest extent practical, hotwork shall be performed by authorized personnel in shops using designated shop hotwork areas. Where hotwork must be performed outside designated areas, the area shall be made fire-safe by removing combustibles or protecting combustibles from ignition sources and by providing a designated trained fire watch(es).

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2. Those performing hotwork shall wear fire retardant/resistant personnel protective equipment (e.g., fire retardant/resistant coveralls, leathers (non-radiological areas only), etc.) For “low hazard” hotwork, fire retardant/resistant/leather full front apron may be utilized, as a minimum. Fire retardant/resistant coveralls (including hoods and boots for radiological areas) are available through Hanford Site Stores. They are color coded “brown” for non-radiological areas and “red” for radiological areas.

4.1 Prepare for Hotwork

Job Supervisor

1. Survey the area to identify combustible materials and hazardous areas at the work site and prepare the work site for the job.

NOTE: The most common materials likely to become involved in a fire are combustible building construction (e.g., floors, partitions, roof assemblies); combustible contents (e.g., wood, paper, textiles, plastics, chemicals, flammable liquids, gases); and combustible ground cover (e.g., grass, brush). Any material that will ignite and burn is considered combustible.

2. Do not allow welding on metal partitions, walls, ceilings, or roof assemblies with combustible coverings or with combustible sandwich-type panel construction.
3. If combustibles are present in the work area:
 - Relocate the job
 - Move the combustibles at least 35 feet away from the work, or
 - Protect the combustible materials within 35 feet of the work by using non-combustible/fire retardant covers, shields, blankets, or, if appropriate, wet the materials.

NOTE: The separation distance and protective measures for “low hazard” hotwork shall be as determined by the job supervisor, in consultation with the Fire Protection Engineer.

4. Verify or have all openings or cracks in walls, floors, systems, and equipment within 35 feet of the work covered or plugged, as appropriate, to prevent sparks from reaching adjacent areas.

Job Supervisor/
Hotworkers

5. Verify that hotwork equipment to be used (e.g., torches, regulators, pressure-reducing valves, manifolds, etc.) is listed or approved by a nationally recognized testing laboratory for the intended use.

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Job Supervisor

6. Verify that oxygen-fuel gas systems (e.g., oxygen/acetylene welders) are equipped with listed and/or approved backflow valves, flash arrester, and pressure-relief devices.
7. If the hotwork will be performed on pipes or other metal, verify that combustibles in contact with the metal are protected from ignition caused by heat conduction through the metal or are relocated away from the heat source.
8. If installed, verify that the automatic fire suppression system is operable. Take special precautions to avoid accidental operation of the system. For example, a wet rag could be laid over a sprinkler head in close proximity to the hotwork operation then removed at the conclusion of the operation.
9. Verify that the work site has adequate ventilation.
10. Verify that there are no flammable concentrations of gases, vapors, liquids, or dust in the atmosphere.
11. If there are smoke detectors in the vicinity of the hot work job, they may be affected by the work. Arrange to have the Hanford Fire Department bypass the affected detectors before the hotwork begins. (Depending on the operation, detectors may need to be covered or removed.) Arrange to have the Hanford Fire Department restore the detectors to service as soon as possible after the job is finished or when the area becomes unoccupied for the day, whichever comes first.
12. Ensure a fire watch(es) is assigned and dedicated to each hotwork job, and is trained/understands the following:
 - The area to be fire watched
 - Potential fire hazards (to personnel and property)
 - Appropriate emergency procedures and actions
 - Methods for sounding the alarm(s)
 - Procedure for manually activating fire suppression systems
 - Received fire watch and hands-on portable fire extinguisher training (Lesson Plan Number 170656 - Schedule through "Training Registration").

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4.2 Before Starting Hotwork Outside Designated Areas

After preparing or verifying the work site, the job supervisor ensures the necessary personnel are ready to begin work and gets the necessary approvals.

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| Job Supervisor | <ol style="list-style-type: none"> 1. Complete a <u>Tank Farm Contractor</u> Hotwork Permit (A-6000-895-1 <u>A-6003-692</u>) before each job. Fax (373-5846) a copy of the completed permit to the Hanford Fire Department for hazard communication purposes. 2. Verify required fire watch(es) are provided with a fully-charged and operable fire extinguisher at the work site throughout the entire job. (Ensure that a separate extinguisher is brought to the work site. Do <u>NOT</u> take a permanently mounted extinguisher in the facility from its storage rack, except in case of fire.) |
| Facility Supervisor | <ol style="list-style-type: none"> 3. Advise personnel involved with the hot work about flammable and combustible materials or hazardous conditions. 4. Authorize the hot work by approving the Hotwork Permit. |
| Job Supervisor | <ol style="list-style-type: none"> 5. If a job remains inactive for longer than one shift after the hot work permit is approved, reverify conditions and initial the Hotwork Permit before beginning work. 6. Verify employees have the appropriate personnel protective equipment for the hazards (i.e., infrared and ultraviolet radiation, radiant heat, fumes, sparks, and hot slag). All workers (e.g., cutters, welders, helpers, fire watches, and other personnel adjacent to the welding areas) shall be protected by removing themselves from exposure to the hazards or by use of proper eye protection, protective clothing, shielding, screens, etc., as appropriate. |

4.3 During Hotwork Outside Designated Areas

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| Hotworkers | <ol style="list-style-type: none"> 1. Before starting, get approval from the job supervisor. Perform hotwork only when the conditions required by the hot work permit are met. |
| Job Supervisor | <ol style="list-style-type: none"> 2. If during the job the shift changes or supervisors, hotworker(s), or fire watch(es) are relieved, have each on-coming supervisor, hotworker, and fire watch review and initial the Hotwork Permit before starting their shift. |
| Fire Watch | <ol style="list-style-type: none"> 3. Monitor the work in progress. Be alert for: <ul style="list-style-type: none"> • Smoke/fire in the clothing of the welder or other personnel in the hot work area |

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- Combustible construction materials or building contents within 35 feet of the work
- Openings that expose combustible materials in adjacent areas within 35 feet of the work
- Combustible materials that could be ignited by sparks (even if the material is more than 35 feet from the work)
- Combustible materials on the interior or on the other side of metal partitions, walls, floors, or ceilings that could be ignited by conduction or radiant heating.

NOTE: The fire watch shall conduct only those duties of the fire watch. The fire watch shall not provide assistance as a welder's helper, supervisor, or any task that may detract from the duties of a fire watch.

Job Supervisor

4. Maintain the fire watch for at least 30 minutes after stopping hotwork.
5. After the job is completed or when the area is becoming unoccupied for the day:
 - Clean up the area and leave it in a safe condition
 - Remove anything that may obstruct the fire system (e.g., covers over smoke detectors, obstructions to sprinkler pattern)
 - If any detectors were bypassed, covered, or removed for the work;, suppression systems were bypassed, or special precautions were taken to avoid accidental operation, contact the Hanford Fire Department to restore the system(s) to normal service.

4.4 Hotwork in Confined Spaces/Areas

These additional steps are required for hotwork in or on confined spaces/areas (e.g., tanks, small rooms, etc.). Also see the company procedure for confined space entry requirements.

Job Supervisor

1. If the job requires hotwork on/in piping, tanks, or similar confined spaces used for flammable/combustible liquids or gases:
 - a. Before starting, complete the Job Hazard Analysis.
 - b. Ensure the interior of items are cleaned of residue.

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- c. Have the atmosphere monitored to ensure the applicable concentration does not exceed 10% of the lower explosive limit. Purging may be required to prevent ignition of flammable atmospheres.
 - d. During the work, perform atmospheric testing at least every eight hours or more frequently if required by the job hazard analysis or work package.
 - e. Ensure adequate ventilation is provided where personnel entry is necessary. (Consult with your industrial hygienist.)
- 2. If oxidizers are involved, contact a Fire Protection Engineer for assistance.
- Hotworkers 3. If arc welding in a confined space is to be suspended or interrupted for any substantial period of time (such as during lunch or overnight):
 - a. Remove all electrodes from the holders.
 - b. Place the holders where they will not be accidentally touched.
 - c. Disconnect (turn off) the machine power supply.
- 4. If gas welding or cutting in a confined space is to be suspended or interrupted for any substantial period of time (such as during lunch or overnight), shut off the gas supply (and drain the lines) at some point outside the confined area to eliminate the possibility of gas escaping through leaks or improperly closed valves. If practical, remove the torch and hose from the confined space.

4.5 Designated Hotwork Areas

A designated hotwork area may be any area that meets all the criteria (as applicable) in items 1 through 6 below. A fire watch is normally not required for designated hotwork areas but may be provided as determined by the job supervisor/facility manager.

NOTE: The TFC Fire Protection Engineer(s) are deputy(ies) of the Hanford Fire Marshal's office and will issue the required permit. See HNF-IP-0842, [Volume 9, Section 5.7](#), "Hanford Fire Marshal Permits," for information on obtaining a permit.

- 1. A Hanford Fire Marshal Permit shall be posted at the designated hotwork area. The permit demonstrates that the area has been reviewed to ensure it qualifies as a designated hotwork area and will have any restrictions listed. The job supervisor/facility manager is responsible to ensure the area is maintained in accordance with the requirements in this procedure and the Hanford Fire Marshal Permit.

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2. The area shall be:
 - a. Fire resistive or non-combustible construction
 - b. If fire resistive or non-combustible construction is not provided, have non-combustible/fire retardant barriers available for protection against hot slag and sparks
 - c. There shall be no unprotected combustible materials (including floors, ceilings, wall or duct openings) within 35 feet of the designated area unless appropriately protected (e.g., fire blankets, fire screens, etc.).

NOTE: For "low hazard" hot work, the separation distance and protective measures for items b and c above shall be as determined by the job supervisor, in consultation with the Fire Protection Engineer.

3. The area shall be provided with a fully charged and serviced portable fire extinguisher (minimum 2A-10BC rating).
4. The area shall have adequate ventilation (consult industrial hygiene, if necessary). Follow paragraph 4.4 of this procedure, if applicable.
5. Inside buildings, the designated area shall be provided with visual protection, i.e., surrounded by a booth or screen constructed of one of the following materials: (1) metal, (2) flame resistant fabric that is opaque to most optical radiation, or (3) transparent colored polyvinyl chloride material that is formulated with a flame retardant and UV-visible absorber in the range of 200 to 3000 nanometers.
6. Those performing hotwork shall wear fire resistant/retardant personal protective equipment (e.g., fire resistant/retardant coveralls, leathers (non-radiological areas)). Fire retardant coveralls are available through Hanford Site Stores. They are color coded brown for non-radiological areas and red for radiological areas. Exceptions to wearing fire resistant/retardant personal protective equipment must be approved by the job supervisor and the TFC Fire Protection Engineer on the Hotwork Permit.

NOTE: In no case may the dedicated fire watch AND the fire resistant/retardant personal protective equipment requirement be waived.

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| Job Supervisor | <ol style="list-style-type: none"> 1. Verify the area has been reviewed and meets the requirements for a designated hot work area. 2. Verify a portable fire extinguisher is readily accessible. 3. Verify the designated area has adequate ventilation. |
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| Job Supervisor/
Hotworkers | <p>4. Verify that hotwork equipment to be used (e.g., torches, regulators, pressure-reducing valves, manifolds, etc.) is listed or approved by a nationally recognized testing laboratory for the intended use and is in good condition.</p> <p>5. Verify that oxygen-fuel gas systems (e.g., oxygen/acetylene welders) are equipped with listed and/or approved backflow valves and pressure-relief devices.</p> |
| Job Supervisor | <p>6. Verify employees have the appropriate personal protective equipment. Hazards include, but are not limited to, infrared and ultraviolet radiation, radiant heat, fumes, sparks and hot slag. All workers (i.e., cutters, welders, helpers, fire watches, personnel adjacent to the welding areas) shall be protected by removing themselves from exposure to the hazards or by use of proper eye protection, protective clothing, shielding, screens, etc., as appropriate.</p> |

5.0 RECORDS

Include any Hotwork Permits and the Job Hazard Analysis for the job in the work package and retain according to JCS records management requirements and [TFC-BSM-IRM DC-C-02](#), "Records Management."

6.0 SOURCES

1. DOE O 420.1A, "Facility Safety." (S/RID).
2. ORP M 420.1-1, "ORP Fire Protection Program." (S/RID)
3. National Fire Protection Association, Standard 51B, "Cutting and Welding Processes."